Exercise 1 – Neural Networks

1. A simple neural model is shown graphically here:



Let T =

Let T =

1. What is the activation?

The activation is

1. If the threshold what is the output ?

The output is

1. What would the output be if the threshold ?

The output is

1. Suppose the learning rate , and the target output . Assume that the threshold . The update equation in general is

The starting weight vector is again

The set of patterns is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Input Patterns | | | Target Output |
|  |  |  |  |
| Pattern p1 | -1 | 0 | 0 | 1 |
| Pattern p2 | -1 | 0 | 1 | 1 |
| Pattern p3 | -1 | 1 | 0 | 1 |
| Pattern p4 | -1 | 1 | 1 | 0 |

For pattern p1 the activation is

So . The update for for pattern p1 is:

1. Write out the specific update equations for pattern p1 every other weight in
2. Write down the weight vector after this single step of learning on pattern p1
3. Now, for incremental learning, show the wight changes, in the first epoch of training, for the patterns until p4
4. Why does the learning not change the weight vector for pattern p4
5. Will the incremental LMS rule still make a weight change for pattern p4
6. Why?